

**DDC and UMCS Drawings User Guide**  
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**This file contains notes that may be helpful but are not guaranteed to be up to date and accurate. Use at your own risk. Please submit comments/suggestions to:**  
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## **Purpose of the User Guide**

To assist designers/draftsmen in editing the DDC and the UMCS drawings described in:

- **UFC 3-410-02:** DIRECT DIGITAL CONTROL FOR HVAC AND OTHER LOCAL BUILDING SYSTEMS
- **UFC 3-401-01:** UTILITY MONITORING AND CONTROL SYSTEM (UMCS)

The drawings were developed AutoCAD 2000 in accordance with A/E/C CAD Standard 2.0 in coordination with CEERD-ID, ERDC-ITL-MS.

## **Drawing availability**

The DDC and UMCS drawings are available at: <https://eko.usace.army.mil/fa/bAS/>

## **File Naming Convention**

File naming is in accordance with A/E/C CAD Standard 2.0, tailored to meet the needs of the control system **drawing sets** and **drawing types** as described below.

Example: Hydronic-HTHW-HX\_M-616a1x.dwg

Up to the first 20 spaces (to the left of “M-”) are user definable; they consist of a short description of the control system.

The next 2 spaces = **discipline** where “M-“ = Mechanical.

The next 1 space = **sheet** type “6”= Schedules and Diagrams.

- The next 2 = **drawing set** (01 thru 19). There are 19 sets of HVAC control system drawings where each set is dedicated to a particular type of control system.
- The next 1 = **drawing type** represented by a letter (a through f). There are “a through f” drawings in a set where each drawing is assigned a letter designation:
- a: Control Schematic
  - b: Ladder Diagram
  - c: Control Logic Diagram
  - d: Sequence Of Operation
  - e: Schedules
  - f: Points Schedule
- The next 1 = drawing type **page number**, in the event there is more than one drawing type each has its own page number (i.e. if there are two Control Schematic drawings, each is numbered sequentially.)
- The next 1 = space filler/holder

The sheet reference number, on the individual drawing sheets, does not show the first 20 spaces of the file name. Instead only the discipline, sheet type, drawing set, drawing letter, and page number are shown.

## Fonts and Text

Font style is CONTROLTXT, and the font type is monotxt.shx. The text height in all drawings is 0.100. Some of the text is multi-line text, and the rest is single line text. If/when changing the properties of the text, the multi-line and single line must be done separately, or ‘select all’ and ‘scale’.

## Layers

Layer naming is in accordance with AEC CADD Standards 2.0, Appendix A (p.A84, AEC CADD Std 2.0).

**Table 1. Layer Naming Convention (Except Border).**

Layer Name	Layer Description	Graphics		
		Line Style	Line Width	Line Color/#
M-ANNO-NOTE	General notes and general remarks	0	0.35	Y/2
M-ANNO-SYMB	Miscellaneous symbols	Varies (V)	0.35	M/5
M-ANNO-TEXT	Misc. text and callouts with associated leaders	V	V	V
M-DIAG-GRPH	Graphics, gridlines, non-text items	V	V	V
M-DIAG-METR	Metric-specific dimensions and notes	0	0.25	G/3
M-DIAG-INPD	Inch-pound-specific dimensions and notes	0.25	R/1	R/3

The layer M-ANNO-NOTE is used in all control schematics and points schedules, and consists of the general notes usually found at the bottom of the drawing. The M-ANNO-SYMB layer is used for all symbols, including the bubbles found in the control schematics and ladder diagrams. All parts of the control logic diagrams are on this layer

as well, except for their surrounding edges. All text, except that in the general notes, is on the M-ANNO-TEXT layer in every drawing. The line color that we chose for this layer is yellow with a line width of 0.35. The M-DIAG-GRPH layer consists of all lines that do not make up a symbol, this includes the ductwork found in the control schematics. The lines that make up the grid lines in the schedules and points schedules are on this layer as well. The line color we chose for this layer is magenta, and has a line width of 0.18. M-DIAG-METR and M-DIAG-INPD are always found in the same place, and overlay one another. The M-DIAG-METR is used when SI units are being used or described, and the M-DIAG-INPD is used when English units are being used or described. These layers are found on the axis of the graphs in the control schematics, as well as in the points schedules when something being described consists of units.

### **Editing the Border**

The border has additional layers beyond those listed in Table 1. To edit the border double-click it (may only pertain to later versions of ACAD, beyond ACAD 2000). If this doesn't work, to edit one attribute at a time, on the menu bar go to the block tab and then global attribute edit. When the cursor turns into a box, click on the attribute you want to change. All attributes may also be viewed and edited by typing "attedit" at the command line.

### **Blocks**

None. No AutoCAD blocks were defined during drawing development.

## **Appendix 1 -Plotting**

For plotting, you can make PDFs, or simply plot from AutoCAD. One drawback when printing straight from AutoCad is that you can't save that exact plot as a computer file. For instance, printing a close-up on a detail will best be served by using a PDF because your second plot at a later time will involve the same tedious plotting "pick" window. Also, use monochrome.ctb in Plot style table (pen assignments) to get even thickness on black & white plots. We plotted to Acrobat distiller, and then printed from Acrobat Reader. This converts the .dwg to a .pdf, which is easier to print at a later time.

## **Appendix 2 - Inserting Excel Spreadsheets into ACAD**

To insert an Excel Worksheet 'Points Schedule' into AutoCAD:

- 1) Insert, OLE Object. Create from file, then Browse for the file you want to insert. You may need to modify the Excel file before inserting, or scale to 50% height and width before inserting, if you want a good plot from ACAD.
- 2) Alternatively, simply copy what you want in excel, and then in ACAD go to "Edit-Paste Special". Once again ACAD only allows a certain area to be pasted in at one time, so you may still need to scale the drawing down in Excel before inserting.

## **Appendix 3 - Inserting ACAD files into Word or PowerPoint**

In AutoCAD, select File/Export, choose Metafile (\*.wmf) from the Save As Type list, then click Save (or use file export command). Zoom in to the area you want to export, because your display is the framed image size of the WMF file. Select the objects that you want to export and press Enter. Prior to saving/exporting a WMF file, you may need to set the WMF background color to 'transparent', using the WMFBKGND command. In ACAD2000, zero (0) represents transparent background color.

In Microsoft Word, select Insert/Picture, choose the WMF file you just created, then click Insert. Your file is now inserted in Word. If you want to change the size of the image, use the frame handles. To crop or change the line colors, double-clicking on the picture opens the picture editing mode. From here you can crop the picture using the margin rulers. To change the colors of the entities, click on the select drawing objects tool, select the entities, then set the line color or other qualities as desired. Click Close picture to return to Word text editing mode.

You might also be able to use "dxfout" from AutoCAD to create an ACAD version 12 .dxf that can be inserted into MS Word, but we had some problems with this.